

## **Enhancing Smart Sport Management based on Information Technology**

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**Abstract:** *Sport organization is a thriving industry. It is vivid, dynamic, and changeable. Besides, it is a lucrative sector, where profits could be increased amazingly and satisfy the owner's organization, particularly, if it is digitized with current state-of-art equipment. However, there was no book before that tackles this interest in details, neither in brief. That is to say, the researcher or the interested individual will not be able to find an access anywhere to what he expects of a clear, coherent and feasible data in this field. According to this urgent need, this book has seen the light, where we consider deeply the necessity of high-tech devices in keeping a sport organization in the forefront and offering inevitable information for those concerned. "Smart Sport Management" will be a cement for many following seminars and books in figure 1 show the book cover. It is a pioneer guide to acknowledge the importance of intermingling between a sport organization on one hand and information technology on the other.*

**Keywords:** *Sport Management, information technology, Internet of Things, Interactive Voice Response.*

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*figure 1: The book cover*

### **I. Introduction**

Stadiums operators are in a squeeze play between fans expecting a more captivating experience and host cities looking for higher returns on their sport's complex investments. With today's sophisticated home entertainment systems and the latest stats and updates available on mobile devices, they need to find new ways to fill the stadium, compel fans to spend more, and keep everyone safe.

Smart stadiums are the answer. They provide fans and staff with wealth of information on parking availability, bathrooms and concession lines, seat upgrades, special offers, and more. Fans get a convenient, personalized experience with shorter lines and directions to navigate faster through crowded stadiums and

parking facilities. The staff receives immediate updates on what is happening in the venue, increasing their efficiency and ability to secure the premises.

The target of this book is to examine the relationship between management of sport organization on one hand and information technology on the other. And shows definitely and clearly how integrating them together could have infinite benefits, accompanied with many topics relevant, such as the bounty of the smart devices available.

The 1<sup>st</sup> & 2<sup>nd</sup> chapters tackle the importance of high-tech devices in stadiums and the hurdles of investing in this field. The 3<sup>rd</sup> chapter presents pioneering smart stadiums around the world as examples of what the first chapter introduced to. The 4<sup>th</sup> chapter contains the multiple equipment for stadiums' services and welfare. Eventually, the 5<sup>th</sup> chapter depicts and foresees the stadium of the future with mesmerizing ideas and dazzling futuristic projects.

## II. Chapter One and Two

Chapter one tackles the importance of the use of advanced devices in sport organization arena. It begins with intro of how they are of a paramount advantage for either the spectators or the infrastructure services of the stadium with live examples, e.g. parking lot entrance, the ability of the controlling smart systems to detect any emergency or defect to handle the problem at once.

After that, the chapter goes further with vital reasons for considering updating the sport institutions with smart devices including: Changing demographics, luring fans away from T.V screen, and boosting revenues.

Whether by building from scratch or retrofitting exiting facilities, stadiums are in a hectic competition with each other to add the latest technologies. While the third part of the book discusses fully, how the information security system work into the stadium, accompanied by exclusive and unique pictures and graphics.

Three producers are essential in the first stage, cameras, sensors, and Internet of Things (IOT) gateway. They are rabidly collected and analyzed by Cloud analytics, allowing stadium operators to make data- driven decisions. The building blocks are shown in figure 2. Moreover, this system guarantees secure transactions in the stadium, and protects the client against any cyber-fraud.

Finally, the chapter comes over the few obstacles of investing in digitalization of stadiums. Due to the fact that this book depicts international stadiums in flourished countries, the hurdles are just few ones. They are the difficulty of applying tech in highly dense areas. And the inconvenience of sport managers of the matter altogether, as they think that these are not mandatory gadgets. In figure 3 Illustrates the smart infrastructure of the stadium.

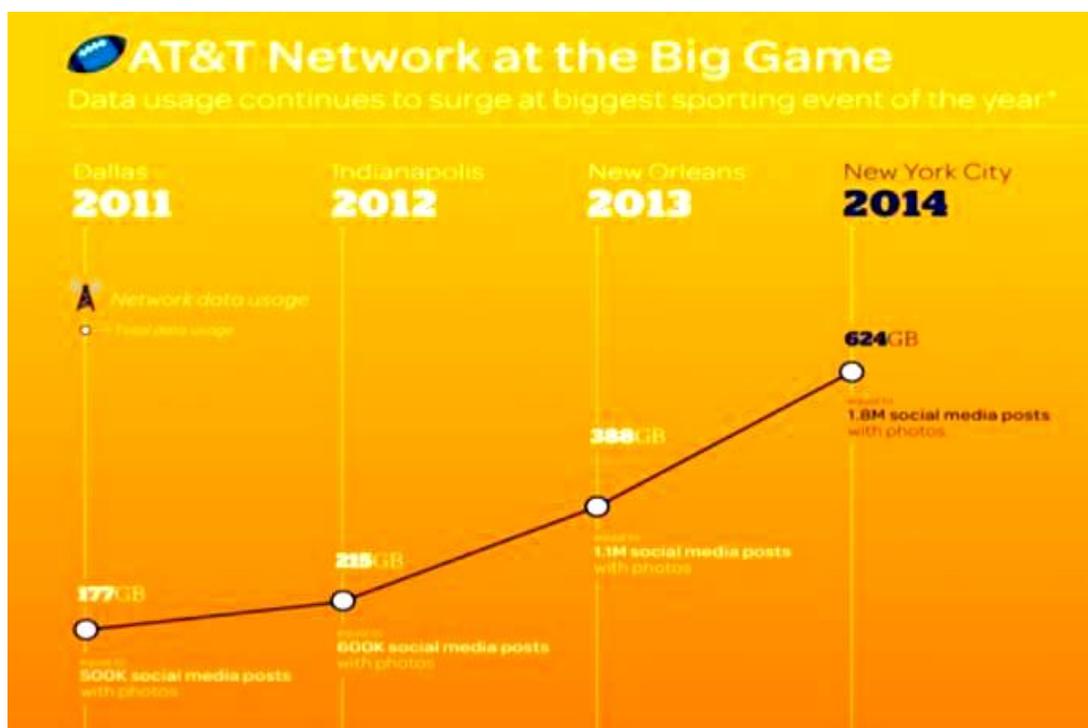


figure 2: building blocks

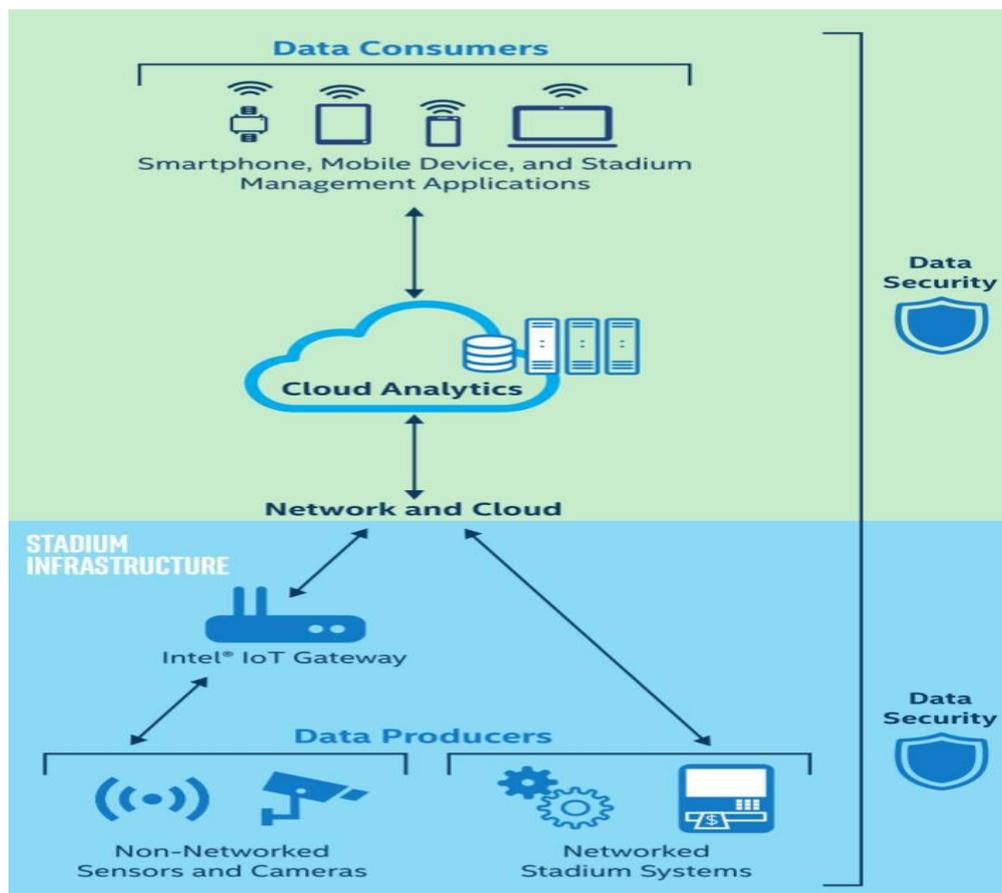


figure 3: The smart infrastructure of the stadium

### III. Chapter Three

This chapter comes as an evidence and vibrant example of what the previous chapter is evolving around. That is to say how implementing technology in the different services of the stadium helped dramatically in setting these sport organizations at the forefront of the most efficient buildings.

The interlude of the journey is with "Allianz Arena". Classified as the most enchanting stadium in Europe, it is quite unique and spectacular because of the LED light system of the exterior structure, which shimmers with the colors of the playing team.

"Bird's Nest" or "Beijing National Stadium" is the second one. What makes it different from the other one is the complicated structure that requires software programs to scale and calculate the construction sums accurately. Also, the operators there use the (CDF) *Computation Fluid Dynamics* simulation, based on the game time situation, to calculate the temperature and airflow at each angle of the structure and optimize all ventilation facilities accordingly.

While the third stadium is Khalifa Stadium, which will host 2022 Olympics. This stadium does not compete the previous stadia; however, it is one of the best few ones in the Middle East. "Levi's Stadium" was the pearl of stadiums as far as tech was concerned until 2014. It is enough to say that the bandwidth aplenty there, 40 times than those in USA, and 4 times of the NFL standard for international stadiums.

"Gillette Stadium" is a very magnificent sport venue, too. It offers various advanced tech qualities. 1.100 access points (APs) wave2. Most of them are of 3.800 & 3.900 series of 802.11ac. Dealing with various devices' systems is another merit; Android, iOS Apple, Linux, and Mac, in addition, to the fabulous "Wi-Fi Blue Cups" to add impressive impact over the atmosphere, and going to the 5GHz, instead of the 2.5GHz, that most stadia rely on. "AT&T Stadium" is the sixth stadium mentioned, it is also extremely competitive one, as smart as Levi's is. AT&T has special features. The longest retractable roof and doors in the world; 91m stadiums dome.

In addition to a gigantic Mitsubishi screen that entered Genesis Record. It is the biggest worldwide. Width: 66m. Length: 288m.

Besides, the fans' LED screen that displays the fans' posts, comments, and names. This is an exceptional advantage for AT&T Stadium so far. And last but not the least, "Barclays Sport Center". At once the visual splendor of the building's OCULUOS appeals to you. And not only that, the center enjoys multiple smart

devices, such as LTE network, 4th generation, the fastest network in the time being. As well as, extra interior network to boost phone calls. In figure 4 show the Typical smart stadium touch points.

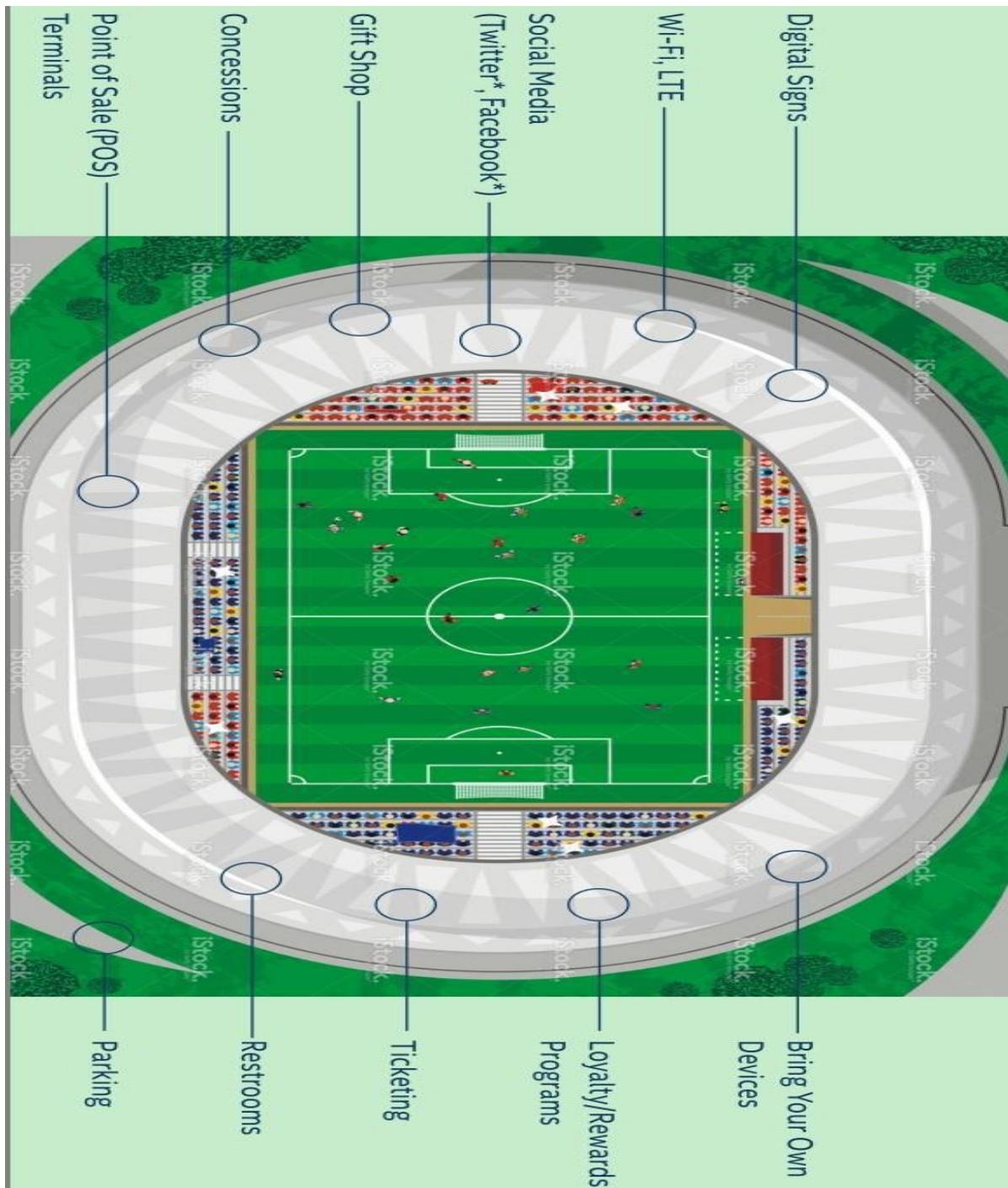


figure 4: Typical smart stadium touch points

#### IV. Chapter Four

The main concern, of this chapter is to present the different types of tech devices into details. It shows they are of three main categories: one to encourage fans to attend the match another to enhance the building infrastructure and its services. And the third is for game's referee.

The first one is very important. There is a fierce race to indulge the fan in the live experience, simply because he is on target. Stadiums match to update with state-of-art tools to lure him, starting with kiosk, beacons, POS, gigantic screens, to HD cameras for exceptional pictures.

Whereas investing technologically in the infrastructure is extremely pivotal. It cost much more money, than anyone think. Sport venues are in feverish marathon, but not a sprint to be in the top tin menu, e.g. Retractable roofs, doors, and turfs. LED light system, HD Wi-Fi, grand digital score record screens, high rollers to deliver food to high value seats, etc. The third type of smart tools is for game's referee. Actually, this advanced equipment play impressive role in crucial decisions throughout the event.

Interactive Voice Response "IVR" is one of them. It helps in the assessment process, if the goal is a field goal or a touchdown and more. Also, there is "Tele Star18 Football", which is another up-to-date smart tool that was used recently during the World Cup Championship. It has many advantages, too, such as the option of (NFC) Near Field Communication to interact with smart devices and beacons. In figure 5 Illustrates the control system inside smart stadium.

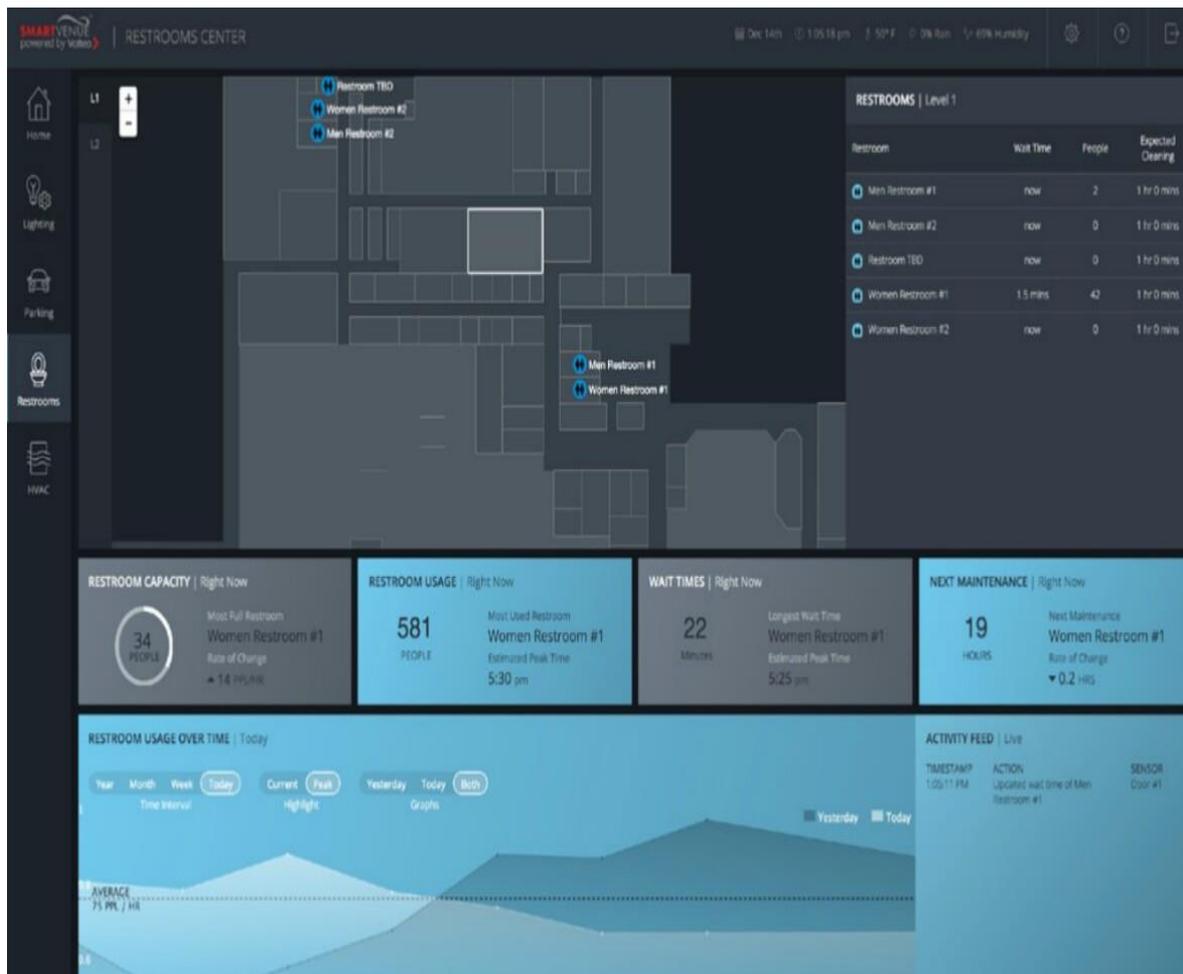


figure 5: control system inside smart stadium

## V. Chapter Five

The beginning of this chapter takes us briefly into a quick journey along the progression of sport venues timeline, starting with "Astrodome" to "Allianz Arena" and finally the dazzling stadium of "Mercedes Benz".

Then it elaborates on the multiple predictable and innovative ideas of the stadium of the future; transparent turf, to watch the event from a different perspective. Robots would be responsible for the sanctification of the stadium. Special air pods would be valid for a short trip across the venue for sightseeing. As well as, a magnetic high-speed train accessible for spectators directly to their seats in no time.

After that, this chapter extends to stadiums that are under-construction. They would overtop and surpass the contemporary ones, like Mercedes Benz Stadium, where we could find unprecedented features, not only the mega column, for displaying grand pictures for the players, and exceptional moments and records throughout the match, but also the biggest Halo screen in the world, 58 feet. And the ticket there is no longer traditional, it is going to be digital. Another magnificent landmark is going to be a tennis court which will be

built underwater in Dubai. It will be the first underwater court worldwide. In figure 6 Illustrates The futuristic stadium, according to National Geographic Magazine.



figure 6: The futuristic stadium, according to National Geographic Magazine

## VI. Conclusion

Likewise, it was very basic to begin the book with the necessity of sport organizations to go techy at first, then to support the reader with the smart stadium techno architecture, secondly, to come across the difficulties of technology implantation in stadia, thirdly, to exemplify with successful sport landmarks to learn from their thrived stories, fourthly, to go into the diverse tech tools, and lastly, to read the map of the future stadium and the promising ideas following.

Technology and sport, both a perfect match that need to keep working together for a successful development in the sport industry. Those two elements are the reason for transforming the way we know sport venues in the time being and design the future of the spectators' experience. In figure 7 show the first underwater tennis court in the world.



figure 7: The first underwater tennis court in the world

### Reference

- [1]. V. Ratten, "Sport-based entrepreneurship: towards a new theory of entrepreneurship and sport management," *International Entrepreneurship and Management Journal*, vol. 7, no. 1, pp. 57–69, Mar. 2010.
- [2]. W. Andrews, "Applied Sport Management Skills," *Managing Leisure*, vol. 15, no. 4, pp. 309–311, Oct. 2010.
- [3]. B. G. Pitts, "Sport Management at the Millennium: A Defining Moment," *Journal of Sport Management*, vol. 15, no. 1, pp. 1–9, Jan. 2001.
- [4]. R. Light and M. A. Dixon, "Contemporary Developments in Sport Pedagogy and their Implications for Sport Management Education," *Sport Management Review*, vol. 10, no. 2, pp. 159–175, Sep. 2007.
- [5]. P. Wicker and C. Breuer, "Understanding the Importance of Organizational Resources to Explain Organizational Problems: Evidence from Nonprofit Sport Clubs in Germany," *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, vol. 24, no. 2, pp. 461–484, Mar. 2012.
- [6]. A. L. Balduck, S. Lucidarme, M. Marlier, and A. Willem, "Organizational Capacity and Organizational Ambition in Nonprofit and Voluntary Sports Clubs," *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, vol. 26, no. 5, pp. 2023–2043, Aug. 2014.
- [7]. O. G. Abood and S. K. Guirguis, "A Survey on Cryptography Algorithms," *International Journal of Scientific and Research Publications (IJSRP)*, vol. 8, no. 7, Jul. 2018.
- [8]. P. Swierzy, P. Wicker, and C. Breuer, "The impact of organizational capacity on voluntary engagement in sports clubs: A multi-level analysis," *Sport Management Review*, vol. 21, no. 3, pp. 307–320, Jun. 2018.
- [9]. J. C. Wo, "Revisiting the Crime Control Benefits of Voluntary Organizations: Organizational Presence, Organizational Capacity, and Crime Rates in Los Angeles Neighborhoods," *Crime & Delinquency*, p. 00112871878751, Jul. 2018.
- [10]. C. G. P. Bellini, "Mastering Information Management," *Journal of Global Information Technology Management*, vol. 12, no. 4, pp. 79–81, Oct. 2009.
- [11]. G. Ping and Y. Yin, "Management and control of sport training system structure," *Information Technology and Industrial Engineering*, Oct. 2013.
- [12]. V. Girginov, K. Toohey, and A. Willem, "Information, knowledge creation and innovation management in sport: an introduction to the thematic section," *European Sport Management Quarterly*, vol. 15, no. 5, pp. 516–517, Oct. 2015.
- [13]. C. Li and Z. Wang, "Research on the Applications of Information Technology in Sport Management," *Communications in Computer and Information Science*, pp. 247–252, 2012.
- [14]. R. Hardin and J. R. Pate, "Emerging Technology in Sport Management Education: Guest Editors' Introduction," *Sport Management Education Journal*, vol. 9, no. 2, pp. 77–78, Oct. 2015.
- [15]. R. P. Barneva and P. D. Hite, "Information Technology in Sport Management Curricula," *Journal of Educational Technology Systems*, vol. 45, no. 3, pp. 326–342, Oct. 2016.
- [16]. J. "Skip" Benamati, A. L. Lederer, and M. Singh, "Changing information technology and information technology management," *Information & Management*, vol. 31, no. 5, pp. 275–288, Jan. 1997.
- [17]. Omar G. A., Elsadd, M. A., & Guirguis, S. K.: Investigation of Cryptography Algorithms used for Security and Privacy Protection in Smart Grid. In *Power Systems Conference (MEPCON)*, 2017 Nineteenth International Middle East, IEEE, 649-644, Dec. 2017.
- [18]. M. Li, B. Pitts, J. Quarterman, and G. Trail, "Research Methods in Sport Management," *Fitness Information Technology: Morgantown, WV. Copyright 2008. 384 pages. \$69.00 US dollars. ISBN 9781885693853.*, *Sport Management Education Journal*, vol. 3, no. 1, pp. 131–137, Oct. 2009.
- [19]. [www.techrepublic.com/article/how-sports-teams-are-scrambling](http://www.techrepublic.com/article/how-sports-teams-are-scrambling), (Last accessed: 1/5/2018).

- [20]. <https://traveldigg/allianz-arena>, (Last accessed:21/7/2018).
- [21]. <https://www.syr-res.com>, (Last accessed: 9/5/2018).
- [22]. <https://time.com/3136272/levis-stadium>, (Last accessed: 11/4/2018).
- [23]. <https://www.geekwire.com/2016/behind-scenes>, (Last accessed: 9/5/2018).
- [24]. <https://www.popularmechanics.com/technology/design>, (Last accessed: 9/5/2018).
- [25]. <https://www.popularmechanics.com/technology/design>, (Last accessed:21/7/2018).
- [26]. <https://www.umbel.com/blog/puplishers/10-ways-stadiums-are-using-technology>, (Last accessed: 5/5/2018).
- [27]. <https://eandt.theiet.org/content/articles/2017/03/stadium-technology-enhancing-the-spectator-experience>, (Last accessed: 9/5/2018).
- [28]. [www.digitalsecuritymagazine.com/ar/2012/05/21/el-allianz-arena-de-munich-combina](http://www.digitalsecuritymagazine.com/ar/2012/05/21/el-allianz-arena-de-munich-combina), (Last accessed: 9/7/2018).
- [29]. <https://traveldigg.com/allianz-arena>, (Last accessed: 9/7/2018).
- [30]. <https://www.curbed.com/2016/2/3/10942528>, (Last accessed:21/7/2018).
- [31]. <http://www.cnet.com/news/at-t-stadium>, (Last accessed:21/7/2018).
- [32]. <https://worldfootballsummit.com>, (Last accessed:6/6/2018).
- [33]. <https://www.barclaycenter.com/news/detail/barclays-center-utilizes-cisco>, (Last accessed:6/6/2018).
- [34]. <https://crn.com/slide-shows/networking/300092196/8-technologies>, (Last accessed: 9/7/2018).
- [35]. <https://www.intel.com/content/en/internet-of-things/solutions-briefs>, (Last accessed: 9/5/2018).



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